

High-Speed Regional Transport System Alternatives Analysis Study

Interim Report of Ridership Forecast & Operating & Maintenance Costs

presented to
SCAG Maglev Taskforce

presented by
Cambridge Systematics, Inc.

October 22, 2008

Transportation leadership you can trust.



Agenda

- Description of alternatives
- Critical assumptions
- Comparison of CMAPD ridership forecasts
- IOS Ridership forecasts
- Station loadings (on's and off's)
- Sensitivity analyses
 - LAX extension
 - Fare adjustments
 - Additional stations
- Operations and maintenance costs



Four IOS Alternatives Two Alignments, Two Technologies



IOS connects West LA to Ontario

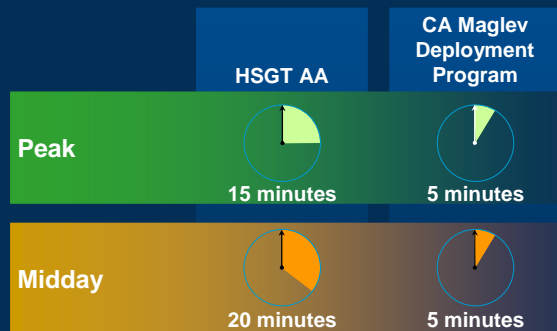
- I-10 Alignment, Maglev
- I-10 Alignment, Steel Wheel
- UPRR Alignment, Maglev
- UPRR Alignment, Steel Wheel



Characteristics of Alternatives Route Miles, Travel Times, Average & Maximum Speed

Route Miles	MAGLEV on I-10	53.83
	SWT on I-10	53.83
	MAGLEV on UPRR	58.15
	SWT on UPRR	58.15
Eastbound Travel Times West LA to Ontario	MAGLEV on I-10	33:55
	SWT on I-10	35:20
	MAGLEV on UPRR	33:26
	SWT on UPRR	36:31
Average Speed (mph)	MAGLEV on I-10	95.2
	SWT on I-10	91.4
	MAGLEV on UPRR	104.4
	SWT on UPRR	95.5
Maximum Speed (mph)	MAGLEV on I-10	233
	SWT on I-10	164
	MAGLEV on UPRR	257
	SWT on UPRR	175

Service Frequency Assumptions Frequency Sufficient to Accommodate Demand



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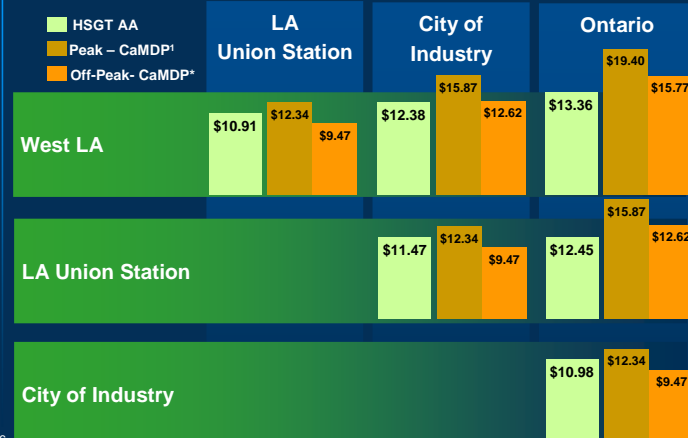
Fare Structure Assumptions for I-10 Alignment One-Way Fares (\$ 2007)

	LA Union Station	West Covina	Ontario
West LA	\$10.91	\$12.17	\$13.36
LA Union Station		\$11.26	\$12.45
West Covina			\$11.19

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Fare Structure for UPRR Alignment One-Way Fare (\$ 2007)



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* CA Maglev Development Program

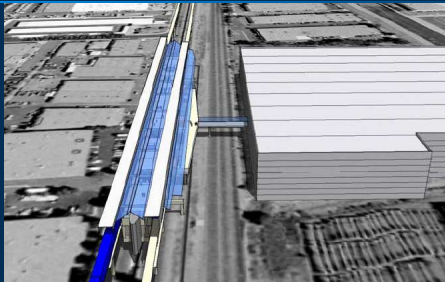
Parking Assumptions Comparison between CMDP and HSRT AA

- HSRT AA
 - Parking unconstrained
 - Parking charge
 - LA Union Station: \$10.60 per day
 - Other HSRT Stations: \$2.50 per day
- CA Maglev Deployment Program
 - Parking unconstrained
 - Parking free

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Station Access Time Assumptions Time from Parked Car to Platform



- CA Maglev Deployment Program assumed 1 min at all stations
- HSRT AA is 4 min at LA Union
- HSRT AA is 5 min at other station

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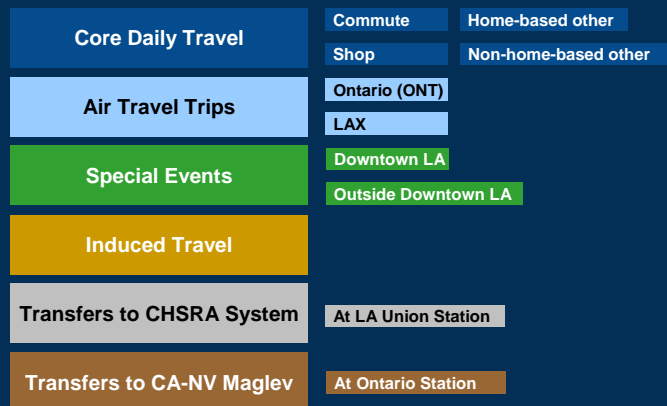
CA Maglev Development Program 2020 Forecast Parsons Transportation Group Alternative 5mc

Adjustment to CMDP 2020 forecast	Reduction	Net Ridership
Total daily ridership		91,570
Remove Riverside & March Extension	-19%	74,490
Remove LAX connection from IOS	-45%	40,770
Increase 5 minute headway to 20	-19%	32,940
Increase 1 minute walk to car to 5	-18%	27,080
Add \$2.50 parking cost	-16%	22,850
Remove "Smart Shuttle"	-9%	20,790
Remove Maglev modal constant	-35%	13,523

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Composition of IOS Ridership Forecast Six Components



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Core Daily Travel Average Daily Trips on IOS in 2035

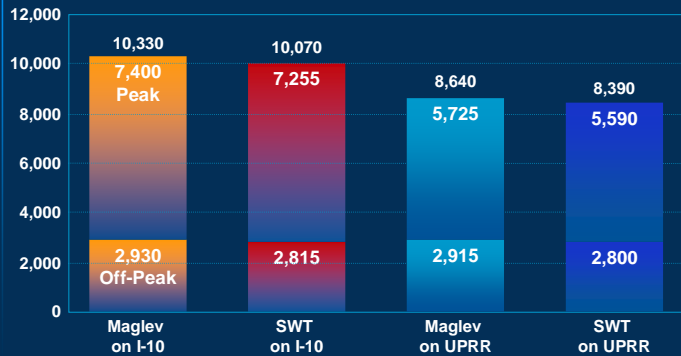
- Total trips between O-D pairs from SCAG model
- Travel times between O-D pairs from SCAG model
- Mode choice using CHSRA Statewide model
- Trip assignment using SCAG model
- Assume HSR and CR have same modal constant
- Removed Smart Shuttles

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Core Daily Travel Average Daily Trips on IOS in 2035

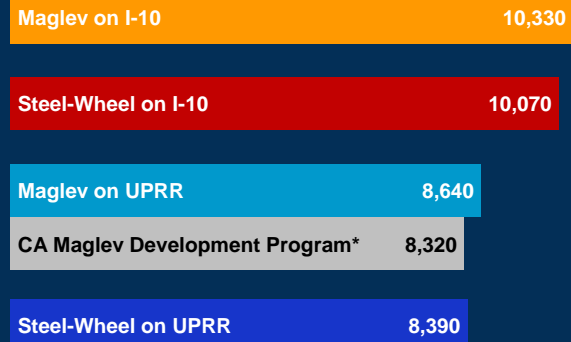
Daily Ridership in 2035



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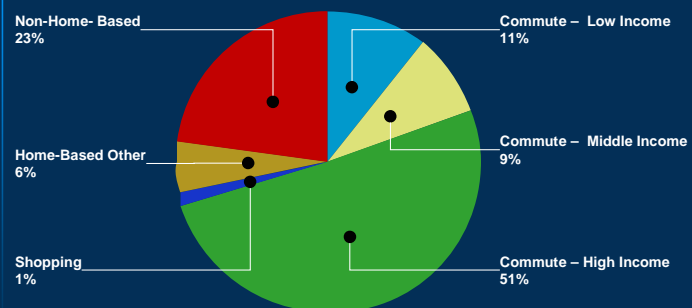
Core Daily Travel Average Daily Trips on IOS in 2035



13 *Forecast year for CMDP is 2020, HSRT AA is 2035

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IOS Average Daily Core Trips in 2035 Six Trip Purposes



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IOS Air Traveler Trips Assumptions & Methodology

- Start with air traveler trips from RADAM model allocated to SCAG zones
 - RADAM preferred scenario without maglev
 - Used in the 2008 RTP
- Apply HSRT mode choice calculated for core daily travel
 - Assume Non-Home-Based trip purpose
- Only includes trips to Ontario Airport
- Average 24,000 Daily Departures & Arrivals at ONT (2007)

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Air Traveler Trips Average Daily Trips on IOS in 2035

Maglev I-10	1,450
Steel-Wheel I-10	1,390
Maglev on UPRR	1,890
CA Maglev Development Program (<i>Alternative 5mc</i>)*	3,720
Steel-Wheel on UPRR	1,830

16 *Forecast year for CMDP is 2020, HSRT AA is 2035



IOS Special Generators & Events

- Start with list of special events from CA Maglev Deployment Program
- Updated with new information
- For each special event, apply HSRT mode choice calculated for regular resident travel
 - Assume Social Recreational trip purpose

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Special Generators & Events Downtown Los Angeles

Special Event	Annual Attendance	Miles to HSRT Station
Olvera Street	2,200,000	0
Little Tokyo	500,000	0.5
Chinatown	120,000	0.5
Dodger Stadium	3,000,000	1.0
Griffith Park	1,600,000	>5.0
Museum of Contemporary Art	300,000	1.0
Music Center	1,200,000	1.0
Staples Center	3,500,000	>1.0
Los Angeles Convention Center	2,500,000	>1.0
TOTAL	14,920,000	

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Special Generators & Events Outside Downtown

Special Event	Annual Attendance	Miles to HSRT Station
UCLA	2,000,000	1.0
Los Angeles Memorial Coliseum	1,500,000	>5.0
University of Southern California	750,000	>5.0
California Poly Institute, Pomona	1,000,000	>5.0
Hollywood Park - Casino	1,000,000	>10.0
Santa Anita Raceway	1,600,000	>5.0
Hollywood Bowl	900,000	>5.0
Pomona Fairplex	2,000,000	>5.0
Ontario Convention Center	400,000	0.5
Universal Studios	4,700,000	>5.0
Hollywood Area	4,000,000	>5.0
Raging Waters	650,000	>5.0
California Speedway	325,000	>5.0
TOTAL	20,825,000	

Special Events Trips

Average Daily Trips on IOS in 2035



20 *Forecast year for CMDP is 2020, HSRT AA is 2035

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Special Events Travel

Why So Low?

- Annual trips all modes: 35,745,000
- Average daily trips all modes: 137,500
- 9% of SCAG population within 4 miles of HSRT stations: 12,400 trips
- 1% mode share: 124 HSRT trips
 - Most of special events more than 1 mile from HSRT station

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Transfers to Other High-Speed Systems



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Connections to CA-NV Maglev

- Assume HSRT acts as a ground access feeder to the CA-NV Maglev system at Ontario
- Start with estimated annual 2035 ons and offs at Ontario for CA-NV Maglev
 - Based on growing 2015 result from CA-NV Maglev Draft Final Ridership Report (Oct 1998)
- Apply HSRT mode choice calculated for regular resident travel
 - Assume Non-Home-Based trip purpose

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Connections to CA-NV Maglev Average Daily Trips on IOS in 2035



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Connections with CA-NV Maglev Why So Low?

- Annual CA-NV boardings at Ontario: 5,870,000
- Average daily trips: 19,600
- 9% of population within 4 miles of HSRT stations: 1,760 trips
- 10% mode share: 176 HSRT trips

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Connections to CA High-Speed Rail

- Assume HSRT acts as a ground access feeder to the CA High-Speed system at LA Union Station
- Start with estimated annual 2035 ons and offs at LAUS for CA HSR (from CS work with CHSRA)
- Apply HSRT mode choice calculated for regular resident travel
 - Assume Home-Based Work trip purpose

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Connections to CA High-Speed Rail Average Daily Trips on IOS in 2035



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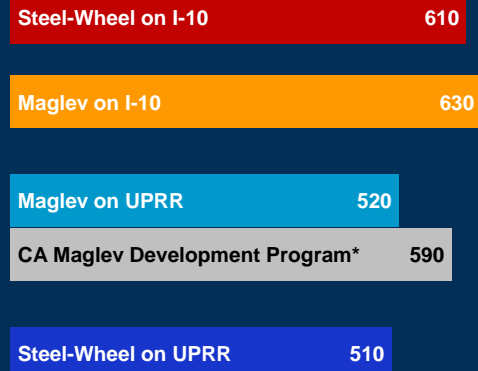
Induced Trips

- Assume HSRT induces 6 percent more regular resident travel
- Similar assumption as CA Maglev Deployment Program

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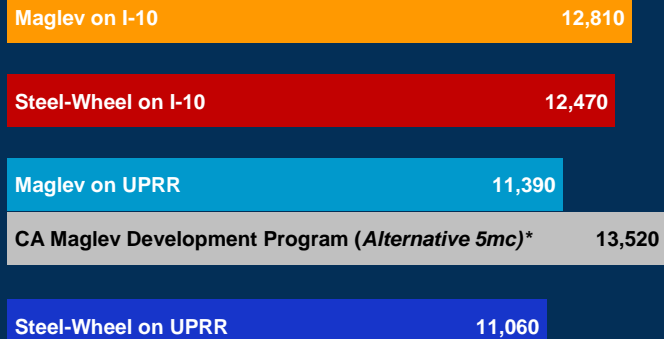
Induced Trips Average Daily Trips on IOS in 2035



29 *Forecast year for CMDP is 2020, HSRT AA is 2035

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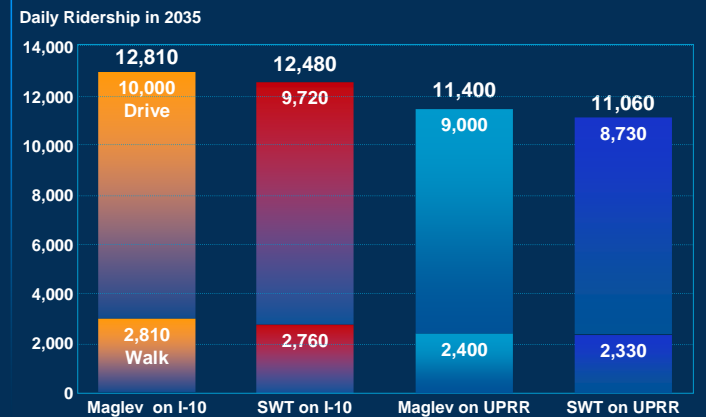
Ridership Summary Average Daily Trips on IOS in 2035



30 *Forecast year for CMDP is 2020, HSRT AA is 2035

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Total Ridership, Drive vs. Walk Access Average Daily Trips on IOS in 2035

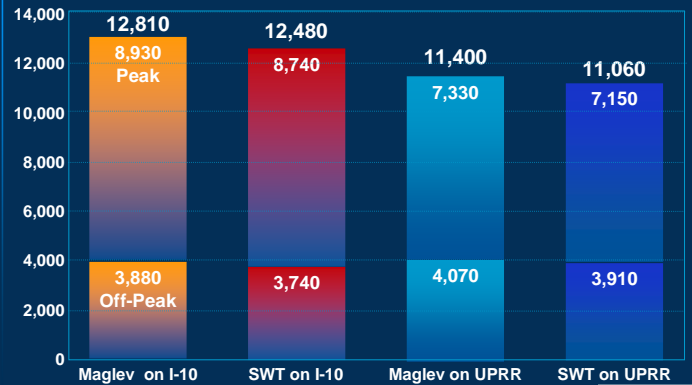


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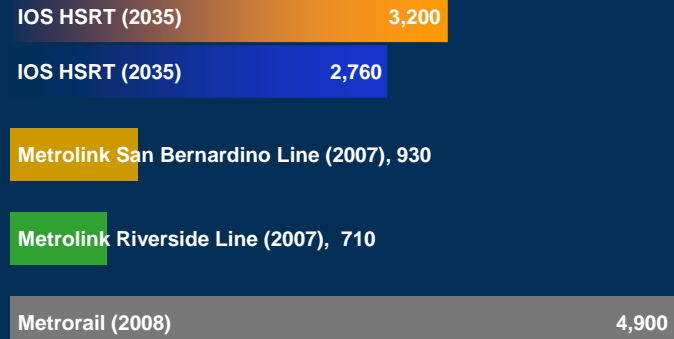
Total Ridership, Peak vs. Off-Peak Travel Average Daily Trips on IOS in 2035

Daily Ridership in 2035



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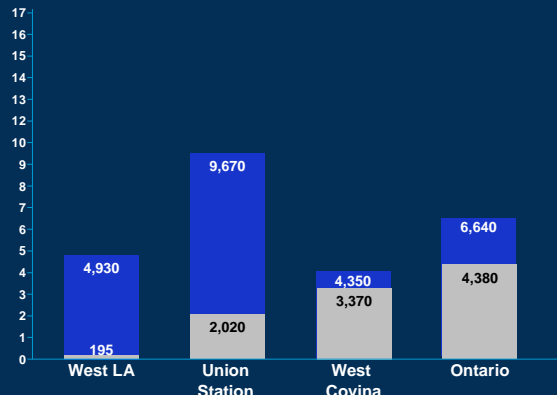
Compare to Other Systems Average Daily Boardings per Station



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Station Loadings for IOS Only On's and Off's and Parking Demand

Thousands of On's & Offs



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Total on's and off's 25,600 Parking demand is 9,970

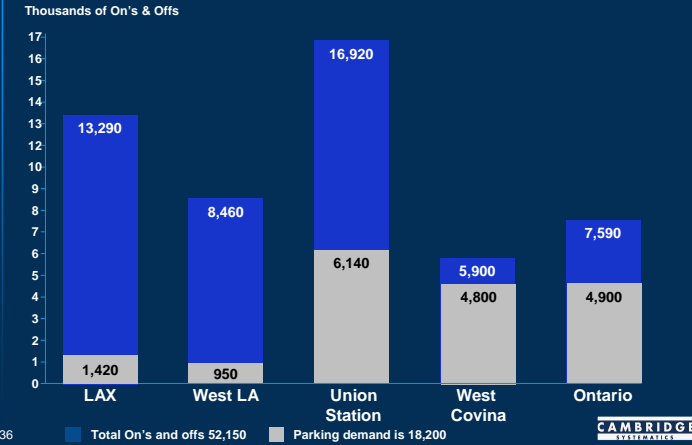
Sensitivity Analysis Average Daily Trips on IOS Plus LAX Extension in 2035



* Amount is an approximation based on a sequence of adjustments

35 Forecast year for CMDP Alternative 5mc is 2020, HSRT AA is 2035

Station Loadings for IOS plus LAX Extension On's and Off's and Parking Demand



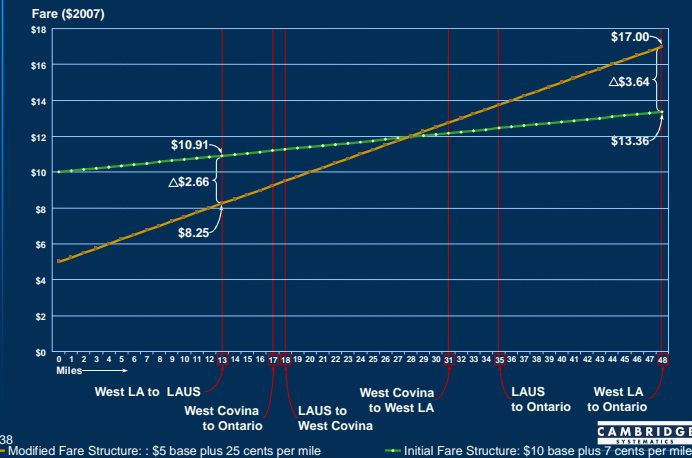
Sensitivity Analysis Fare Structure

- Using fare structure with greater distance based component increases ridership from 12,800 to 16,190.
 - Revenue impact unclear because might have resulted in lots of short low fare trips, but most likely revenue has gone up.
- Starting with revised fare structure, if increase fare 50%, ridership goes down 52% to 7,790
 - Likely reduction in revenue
- Starting with revised fare structure, if decrease fare 50%, ridership goes up 55% to 25,060
 - Unclear revenue impact

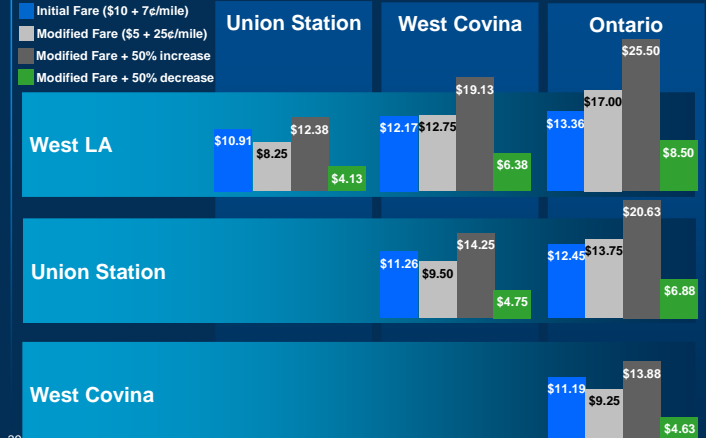
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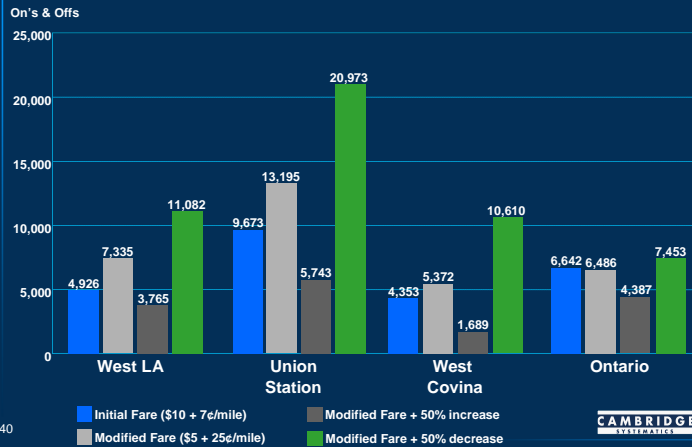
Fare Structure Initial and Modified Fare Structure



Initial and Modified Fare Structures I-10 Alignment One-Way Fare (\$ 2007)



Station Loadings (On's and Offs) Initial and Modified Fare Structure



Additional Stations Locations of Three Additional Stations



Additional Stations Travel Times on the IOS, Maglev on I-10 Alignment

Travel Times between West LA to Ontario	Four Stations West Bound	34 minutes
	Four Stations East Bound	34 minutes
	Seven Stations West Bound	41 minutes
	Seven Stations East Bound	41 minutes
Average Speed miles per hour (mph)	Four Stations West Bound	96 mph
	Four Stations East Bound	95 mph
	Seven Stations West Bound	80 mph
	Seven Stations East Bound	79 mph
Maximum Speed miles per hour (mph)*	Four Stations West Bound	236 mph
	Four Stations East Bound	233 mph
	Seven Stations West Bound	209 mph
	Seven Stations East Bound	208 mph

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* Max lateral acceleration is 1g for all alternatives

Additional Stations Summary Findings

- Three additional stations increases:
 - End to end travel time by about 21%, from about 34 minutes to 41 minutes
 - Average speed has gone down 17%, from 96 to 79 mph
 - If half of trains are local (stopping at all 7) and half are express (stopping at 4 stations), then 4-tracking at stations would not be needed with 15 minute peak headway
 - Relatively slow switching time for Maglev would hamper its performance if:
 - Headways are decreased or
 - A larger Maglev network is built
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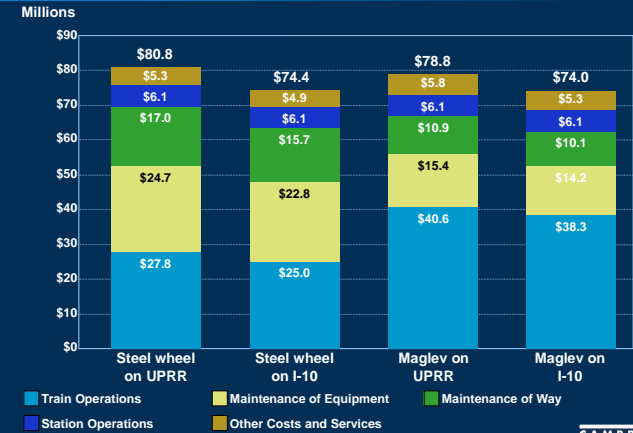
Operating Costs Maglev & High Speed Train Power Draw on I-10 Alignment



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Annual Operating Costs West LA to Ontario Train Crew, Propulsion, Control Center (2008\$ millions)



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Annual Operating Costs West LA to Ontario Summary Findings

- Operating cost between \$74M and \$81M
- \$5-6M more to operate on UPRR alignment
- Maglev and steel wheel operating costs similar
 - Maglev has lower maintenance cost
 - Maglev has higher propulsion cost
- Operating costs higher because of increased energy cost
 - Roughly 10% higher than Maglev Deployment Phase 1 estimate
 - Roughly 10% higher than SCAG LAX/South (Orange County) High-Speed Ground Access Study*

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* SCAG LAX/South (Orange County) High Speed Ground Access Study Status Report, Feb. 2007

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Next Steps

- Capital Costs
- Revenue Analysis
- Final Report

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